

Library Database Project Report

Prepared by: Group 2

Sage Hoepfl, Maya Chwairy, Denis Urias, Shivangi Tokas

INFO 364-003 Database Systems

December 20, 2022

Application Domain

When it comes to the library of an educational institution, not only do the students use it, but a lot of other individuals such as researchers, PhD candidates, faculties, and many others make good use of it. It becomes very crucial to systematically organize all of the available resources including books, research papers, articles, etc. Additionally, there should be a proper record and track of all the books which are available in the library and which books are borrowed/reserved/rented by people, etc. It is possible to track all of these processes manually when the size of the organization is small. Still, when it comes to big organizations like libraries, it is nearly impossible to track and update records manually. This could possibly lead to the following problems:

- Books getting misplaced
- Books issued never returned
- Returning a different book

In order to overcome the few listed problems and other problems which may arise in the normal course of operations, we believe a database management system should be created and maintained which can help to tackle such problems. With the help of the database system, we can:

- Pinpoint the shelf of the available books
- Manage the reservation of books
- Check the availability of the books
- Keep track of borrowed books
- Ensure a timely return of books
- Review that correct books are returned
- Manage the pick-up of a book

With proper maintenance of the database, the operations of the library can run smoothly and the employees can monitor the books more efficiently. The database can be updated easily when any new books are being added and it makes the books easier to identify since every book has a unique ID to it. With a proper system in place, the job can be made a lot easier and more efficient.

In our Database Model, the portal for VCU Library users has options to see your loans, requests, fines & fees; however, there is no option from which anyone can rent materials from.

With that being said, the purpose of this database would be to provide additional service on the portal to reserve/rent materials for students, faculty, and staff to pick up. For this service to occur, there would be verification needed. Verification would include a combination of the following: V#, Last four digits of VCU Card Number, Last four digits of SSN, and DOB. Additional verification when picking up reserved materials may include showing proof of VCU Card. The overall mission for this is to improve efficiency in renting out materials prompting a quicker, better library experience.

Business Rules and User Requirements

Business Process #1

- Loan an item

Business Rules

- A user cannot checkout an item if they have any overdue restrictions
- A user cannot checkout an item without verification from a librarian

User Requirements

- Must be a VCU student
- Item must not be checked out

Business Process #2

- Interlibrary loan

Business Rules

- A library cannot request an item without submitting a request form
- Item must be available to reserve

User Requirements

- The user must submit a request form for an item
- Users must meet qualifications to have their request form approved

Business Process # 3

- Return an item

Business Rules

- The item must be checked out under the user

User Requirements

- A user must return an item on or before the due date
- A user must return the item in the probable condition

Business Process # 4

- Renew an item

Business Rules

- Item must not be reserved for another user
- A user has up to 5 renewals if the item is not reserved

User Requirements

- A user must be under 5 renewals to renew
- The user has the item checked out

Business Process #5

- Pay a fee

Business Rules

- A user has a grace period of 5 days after the scheduled return date with no fee
- A user must pay a fee after the 5-day grace period

User Requirements

- The user must have an item checked out
- The user has not returned the item after the grace period

Full Data Dictionary

Entities

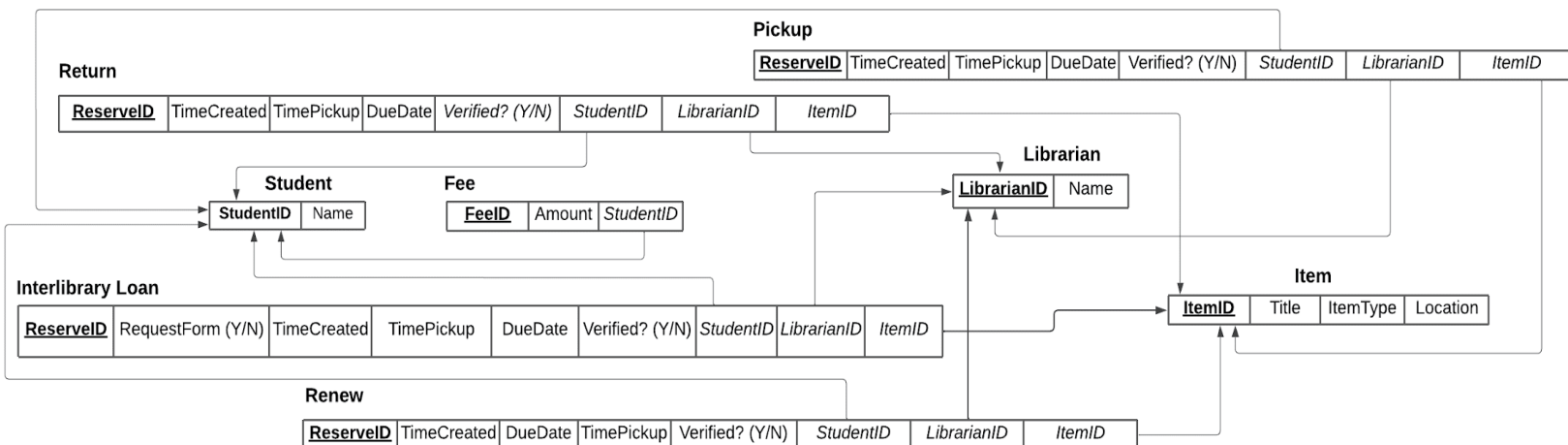
Attributes

1. StudentID **StudentID**, Name
2. Librarian **LibrarianID**, Name
3. Item **ItemID**, Title, Item Type, Location
4. Pickup **ReserveID**, Time Created, Due Date, Pickup Time, Is Student Verified?, *FK*, *FK*, *FK*
5. Return **ReserveID**, Time Created, Pickup Time, Due Date, Is Student Verified?, *FK*, *FK*, *FK*
6. Renew **ReserveID**, Time Created, Pickup Time, Due Date, Is Student Verified?, *FK*, *FK*, *FK*
7. Fee **FeeID**, Amount of fee, StudentID
8. Interlibrary Loan **ReserveID**, Time Created, Due Date, Pickup Time, Is Student Verified?, *FK*, *FK*, *FK*

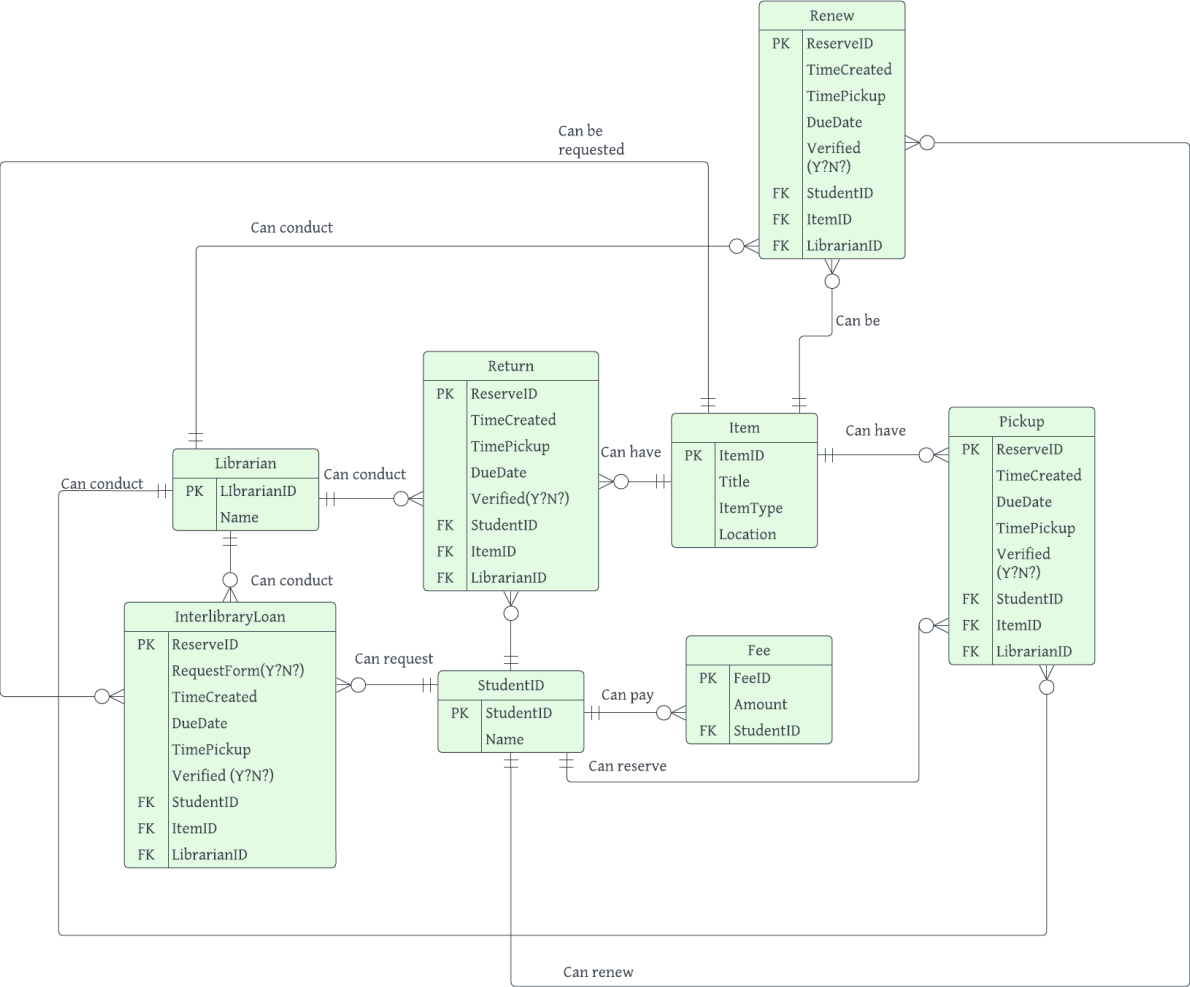
Relationships

1. A student **can reserve** an item for pickup
2. A student **can renew** a pickup
3. A student **can pay** a fee
4. A librarian **can conduct** a renewal
5. A librarian **can conduct** a return
6. A librarian **can conduct** a pickup
7. A librarian **can conduct** an interlibrary loan
8. An item **can have** a pickup
9. An item **can be** renewed
10. An item **can be** returned
11. An item **can have** a request form for an interlibrary loan

Relational Diagram



Enhanced Entity Relationship Diagram (EERD)



Select Statements

(1) Which students have fees due?

```
SELECT s.StudentName, f.StudentID, f.FeeID, f.Amount
FROM Fee f INNER JOIN Student s
ON s.StudentID = f.StudentID
ORDER BY StudentName DESC;
```

OUTPUT:

StudentName	StudentID	FeeID	Amount
Sara Cooks	1567921	456792	7
Kim Gary	1245567	444333	5
Harry Styles	1234545	423321	25
Carrie Rodgers	1222267	465588	10

(2) What is the due date for students who have requested an interlibrary loan?

```
SELECT s.StudentName, s.StudentID, il.DueDate
FROM Student s JOIN InterlibraryLoan il
ON s.StudentID = il.StudentID
ORDER BY il.DueDate DESC;
```

OUTPUT:

StudentName	StudentID	DueDate
Sammy Han	1234514	2023-9-13
Sara Cooks	1567921	2023-12-16
Scottie Williams	1234337	2023-12-10
Harry Styles	1234545	2023-10-31

(3) Which students have items that are overdue if the current date is 2023-12-31?

```
SELECT s.StudentName, p.StudentID, p.DueDate, p.ItemID, i.Title
FROM Student s, PickupItem p, item i
WHERE s.StudentId = p.StudentId
AND i.ItemID = p.itemID AND p.DueDate < '2023-12-31'
ORDER BY s.StudentName DESC;
```

OUTPUT:

StudentName	StudentID	DueDate	ItemID	Title
Scottie Williams	1234337	2023-12-16	333444	The Great Gatsby
Rich Smith	1234567	2023-12-10	312668	IT
Harry Styles	1234545	2023-12-13	365412	WSJ Newspaper
Carrie Rodgers	1222267	2023-10-31	336655	Wired Headphones

(4) Which media items does the library database have?

```
SELECT Title, ItemID, ItemType
FROM Item
WHERE ItemType = 'Media'
ORDER BY Title DESC;
```

OUTPUT:

Title	ItemID	ItemType
Mozart CD	398754	Media
Bob Ross Movie	374125	Media

(5) Who has the Great Gatsby checked out?

```
SELECT s.StudentName, s.StudentID, p.DueDate, i.title
FROM Student s
JOIN PickupItem p ON s.StudentID = p.StudentID
JOIN item i ON i.itemID = p.ItemID
WHERE i.title = "The Great Gatsby";
```

OUTPUT:

StudentName	StudentID	DueDate	Title
Scottie Williams	1234337	2023-12-16	The Great Gatsby

(6) Student name starting with “S”?

```
SELECT *
FROM Student
WHERE StudentName Like 'S%'
ORDER BY StudentName DESC;
```

OUTPUT:

StudentID	StudentName
1234337	Scottie Williams
1567921	Sara Cooks
1234514	Sammy Han

(7) How many students have been issued different items from the library?

```
SELECT Student.StudentID, StudentName, DueDate, ItemID
FROM Student, PickupItem
WHERE Student.StudentID = PickupItem.StudentID;
```

OUTPUT:

StudentID	StudentName	DueDate	ItemID
1234545	Harry Styles	2023-12-13	365412
1234337	Scottie Williams	2023-12-16	333444
1222267	Carrie Rodgers	2023-10-31	336655
1234567	Rich Smith	2023-12-10	312668

(8) How many items are available under each item type?

```
SELECT ItemType, COUNT (ItemType)
FROM Item
GROUP BY ItemType
ORDER BY ItemType DESC;
```

OUTPUT:

ItemType	COUNT (ItemType)
Research	1
Novel	2
Media	2
Equipment	2

(9) Details of student who requested an item for renewal?

```
SELECT Student.StudentID, StudentName, Title, DueDate
FROM Student, RenewItem, Item
WHERE Student.StudentID = RenewItem.StudentID
AND Item.ItemID = RenewItem.ItemID
ORDER BY StudentName DESC;
```

OUTPUT:

StudentID	StudentName	Title	DueDate
1234337	Scottie Williams	The Great Gatsby	2022-12-16
1567921	Sara Cooks	WSJ Newspaper	2022-12-13
1234567	Rich Smith	IT	2022-12-10
1222267	Carrie Rodgers	Wired Headphones	2022-10-31

(10) Details of NOVEL available in the library?

```
SELECT *
FROM Item
WHERE ItemType = 'Novel'
ORDER BY Title DESC;
```

OUTPUT:

i	ItemID	Title	ItemType	ItemLocation
333444		The Great Gatsby	Novel	ISBN 9876
312668		IT	Novel	ISBN 8765

(11) Which librarian was available during the return of an item?

```
SELECT Librarian.LibrarianID, LibrarianName, Title, DueDate
FROM Librarian, Item, ReturnItem
WHERE Librarian.LibrarianID = ReturnItem.LibrarianID AND Item.ItemID =
ReturnItem.ItemID
ORDER BY LibrarianName DESC;
```

OUTPUT:

i	LibrarianID	LibrarianName	Title	DueDate
2231452		Patricia Long	WSJ Newspaper	2023-12-13
2231452		Patricia Long	Wired Headphones	2023-10-31
2231452		Patricia Long	IT	2023-12-10
2331576		Kimberly Rachels	The Great Gatsby	2023-12-16

(12) Items that were verified at every step i.e Pickup, Renew, and Return?

```
SELECT Item.Title, ItemType,
PickupItem.verified AS Pickup_Item_Verified,
ReturnItem.verified AS Return_Item_Verified,
RenewItem.verified AS Renew_Item_Verified
FROM Item, PickupItem, RenewItem, ReturnItem
WHERE RenewItem.ItemID = PickupItem.ItemID
AND PickupItem.ItemID = RenewItem.ItemID
AND RenewItem.ItemID = ReturnItem.ItemID
AND PickupItem.verified = 'Y'
ORDER BY Title DESC;
```

OUTPUT:

i	Title	ItemType	Pickup_Item_Verified	Return_Item_Verified	Return_Item_Verified
	Wired Headphones	Equipment	Y	Y	Y
	WSJ Newspaper	Research	Y	Y	Y
	IT	Novel	Y	Y	Y

(13) Student who reserved either a Research Article or Novel?

```
SELECT Student.StudentName, Item.Title, Item.ItemType,
PickupItem.DueDate
FROM Student, Item, PickupItem
WHERE Student.StudentID = PickupItem.StudentID
AND PickupItem.ItemID = Item.ItemID
AND (Item.ItemType = 'Research' OR Item.ItemType = 'Novel')
ORDER BY StudentName DESC;
```

OUTPUT:

StudentName	Title	ItemType	DueDate
Scottie Williams	The Great Gatsby	Novel	2023-12-16
Rich Smith	IT	Novel	2023-12-10
Harry Styles	WSJ Newspaper	Research	2023-12-13

(14) Which book/item is issued by which student?

```
SELECT Student.StudentID, StudentName, title, DueDate
FROM Student, PickupItem, Item
WHERE Student.StudentID = PickupItem.StudentID
AND item.itemID = PickupItem.ItemID
ORDER BY Title DESC;
```

OUTPUT:

StudentID	StudentName	Title	DueDate
1222267	Carrie Rodgers	Wired Headphones	2023-10-31
1234545	Harry Styles	WSJ Newspaper	2023-12-13
1234337	Scottie Williams	The Great Gatsby	2023-12-16
1234567	Rich Smith	IT	2023-12-10

(15) Which Librarian(s) processed an InterLibrary Loan with an Unverified item?

```
SELECT Librarian.LibrarianID, Librarian.LibrarianName, RequestForm,
DueDate, Verified
FROM Librarian, InterLibraryLoan
WHERE Librarian.LibrarianID = InterLibraryLoan.LibrarianID
AND Verified = 'N'
ORDER BY LibrarianName DESC;
```

OUTPUT:

LibrarianID	LibrarianName	RequestForm	DueDate	Verified
2234514	Sam Banks	Y	2023-12-16	N